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U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS.

DIETARY STUDIES

AT THE

UNIVERSITY OF MISSOURI

IN

1895,

AND

DATA RELATING TO BREAD AND MEAT CONSUMPTION IN MISSOURI.

BY

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WITH COMMENTS,

BY

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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., June 15, 1896.

SIR: I have the honor to transmit herewith a report on the food supply and consumption in Missouri, made in 1895, by H. B. Gibson, professor of chemistry of the University of Missouri, S. Calvert, and D. W. May. Two dietary studies of a students' club at the University of Missouri and an investigation of the relative bread and meat consumption in families in the State are included in this report. These investigations constitute a part of the inquiries made with aid of the funds appropriated by Congress "to enable the Secretary of Agriculture to investigate and report upon the nutritive value of the various articles and commodities used for human food." They were conducted under the immediate supervision of Prof. W. O. Atwater, special agent in charge of nutrition investigations, in accordance with instructions given by the Director of this Office.

In carrying out the provisions of the act above cited, representative localities have been selected in different parts of the country in order that definite information regarding the food supply and consumption of people living under different conditions might be obtained. The University of Missouri, at Columbia, Mo., offered many facilities for dietary work. It has well-equipped laboratories, and the department of chemistry was under the direction of Professor Gibson, one of the best authorities on dietary work in America. It was the original intention to make a somewhat extended series of investigations, but the work which was begun by Professor Gibson was interrupted by his untimely death in October, 1895. Comments on these investigations made by Professor Atwater and Mr. Woods, and appended to Professor Gibson's report herewith, indicate the value of the Missouri dietary investigations when taken in connection with those carried on elsewhere.

Professor Gibson's report and the accompanying comments by the special agents of this Department are respectfully submitted, with the recommendation that they be published as Bulletin No. 31 of this Office.

Respectfully,

A. C. TRUE,
Director.

HON. J. STERLING MORTON,
Secretary of Agriculture.

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INVESTIGATIONS CONCERNING FOOD SUPPLY AND CONSUMPTION IN MISSOURI IN 1895.

This investigation has been prosecuted in two directions, namely, (1) an inquiry regarding the bread and meat consumption in the State, and (2) the studies of two dietaries of a students' boarding club at the State university.

PLAN OF INVESTIGATIONS.

The methods followed in the two dietaries described in this report are essentially those explained by Professor Atwater in a previous publication of this Office.[1] The waste, however, was treated in a different way, which is described in detail. The methods used in analysis are those described in the report of the Connecticut Storrs Station for 1891, pp. 47–49, and in Bulletin No. 29 of this Office, p. 8.

BREAD AND MEAT CONSUMPTION.

The university community furnishes an excellent field for the collection of approximate statistics regarding the dietary practices which prevail throughout the State. The students represent almost every county in the State, and are drawn from families in all the ordinary walks of life. Information furnished by them as to the kinds and approximate quantities of bread and meat used in their homes, while doubtless not accurate in comparison with, for instance, the statistical results of the study of a dietary, compares favorably with the quality of the average statistical information. With a view to the collection of information of this character, a circular, of which the following list of questions formed the essential feature, was placed in the hands of the students of the university:

GENERAL STATISTICS.

Home residence.—Town, ———. County, ———.

Occupation.—Please underscore the occupation of the head of your family: Farmer. Mechanic. Business. Professional.

Family.—Number of persons over 18 years, ———. Number of persons 12 to 18 years, ———. Number of persons under 12 years, ———.

SPECIAL STATISTICS.

Bread.—Please state the approximate percentages of the following kinds of bread used in your home: Biscuit, —— per cent; light bread, —— per cent; corn bread, —— per cent.

[1] U. S. Dept. Agr., Office of Experiment Stations Bul. 21.

Meat.—Please state the approximate percentages of the following kinds of meat used in your home: Beef, —— per cent; veal, —— per cent; pork, —— per cent; mutton, —— per cent; poultry, —— per cent; game, —— per cent; fish, —— per cent.

Two hundred and eighty-two replies, representing as many families, living in 74 of the 114 counties of the State, were received. These statistics are given in a condensed form in Table 1. The proportions of the various kinds of bread and meat used at the college boarding club are also included in the table, the quantities of biscuit and corn bread being estimated from the amounts of flour and corn meal which were consumed during the dietary tests. All the raised bread used at the club was purchased at a local bakery.

The figures in the table express percentages and not amounts. Those for bread show the percentage which each kind is estimated to make of the total bread used. The same is true with the meat. That is to say, when the reports from the farmers' families were classified and their statements averaged, it appeared that in 142 families, living in 59 counties, the average number of persons per family was 6.4. Of every 100 pounds of "bread" used by these families 53.7 pounds were in the form of biscuit, 30.7 pounds were raised bread, and 15.6 pounds corn bread. Of the total weight of meat 56.9 per cent was pork, 20.9 beef, and 12.9 poultry, the remainder consisting of mutton, veal, fish, and game.

TABLE 1.—*Approximate bread and meat consumption of families in Missouri.*

Occupation.	Families.		Counties represented.	Kinds of bread.			Kinds of meat.						
	Total number.	Average number of persons.		Biscuit.	Raised bread.	Corn bread.	Beef.	Veal.	Pork.	Mutton.	Poultry.	Game.	Fish.
				P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Mechanics	14	5.1	6	46.7	41.4	11.9	40.2	2.9	32.4	3.6	11.0	2.8	7.1
Business	77	5.4	31	44.9	41.8	13.3	49.6	4.0	23.5	2.7	12.0	2.8	5.4
Professional	48	5.4	28	52.6	36.2	11.2	47.0	3.3	25.3	4.5	11.7	3.1	5.1
Average	......	......	.....	48.1	39.8	12.1	45.6	3.4	27.0	3.6	11.6	2.9	5.9
Farmers	142	6.4	59	53.7	30.7	15.6	20.9	.9	56.9	2.7	12.9	2.9	2.8
University boarding club	......	......	.....	45.0	46.0	9.0	66.0	......	26.0	......	6.0	......	2.0

The contrast between the food consumption of the farmers' families (country population) and those of mechanics, business and professional men (largely town population) is well defined, and in some respects even striking. Especially is this true of the meats consumed. The farmer does not have easy access to the butcher's shops, and furthermore has no conveniences for keeping fresh beef. He therefore lives largely on pork and poultry, the former being more palatable when preserved than when fresh, and the latter always at hand.

THE DIETARY STUDIES.

The university boarding club is specially adapted to a dietary study. This club, which has a membership of approximately 100, is conducted in essentially the same manner as the numerous boarding clubs which form such a prominent feature of American college communities. Its members, with few if any exceptions, are Missourians, coming from families engaged in the ordinary vocations and living in all portions of the State. These young men live in a thoroughly substantial although modest fashion, their table being, in so far as practicable, copied after the dietary practices of their own homes. The extent to which they succeed in this may be seen from Table 1. The percentages of biscuit, raised bread, and corn bread do not differ essentially from those prevalent in the State at large; that of the beef is noticeably higher. This is due largely to two causes, namely, an opportunity for the storage of fresh meat, which is of course wanting in rural communities, and perhaps more especially to the fact that the club buys its beef by the quarter during a considerable portion of the year.

The details of the dietaries will be found beyond (Tables 6, 7, 8, 9, 10, and 11). The preliminary test (No. 94)[1] covered a period of six consecutive days, and the final test (No. 95) a period of seven consecutive days. The amount of nutrients purchased, wasted, and eaten per man per day in each test and the average of the two are shown in the following table:

TABLE 2.—*Nutrients purchased, wasted, and eaten per man per day.*

	Protein.	Fat.	Carbohydrates.	Fuel value.	Nutritive ratio.
Purchased:	*Grams.*	*Grams.*	*Grams.*	*Calories.*	
No. 94	107	169	458	3,885	....
No. 95	107	183	443	3,960	....
Average	107	176	450	3,920	....
Wasted:					
No. 94	11	14	41	350	....
No. 95	11	18	39	375	....
Average	11	16	40	360	....
Eaten:					
No. 94	96	155	417	3,540	1:8.0
No. 95	96	165	404	3,585	1:8.0
Average	96	160	410	3,560	1:8.0

These dietaries are striking in point of their comparatively high potential energy and wide nutritive ratio, due to the relatively large proportions of fats and carbohydrates. The protein consumed (95 grams) is slightly below the average, and furthermore 40 per cent of the protein is of vegetable origin, principally from bread. Inasmuch as the digestibility of the vegetable protein is slightly less than that of the animal protein, the actual metabolism of the nitrogen compounds could hardly have exceeded 90 grams. This possible shortage seems

[1]The numbers of the dietary studies are laboratory numbers used in the investigations of which this study forms a part.

to have been covered by an increased consumption of fats, the average amount being 161 grams. This substitution can, however, scarcely be regarded as detrimental, as it does not entail an undesirable excess of the carbohydrates, which is usually the most noticeable defect in dietaries with so wide a nutritive ratio.

The protein compounds form 14.4 per cent of the weight of the total nutrients, and their energy amounts to 11 per cent of the total energy.

The method employed in handling the table and kitchen wastes deserves special attention. The wastes were kept in three distinct portions, namely, (1) meats and other animal food materials; (2) bread of all descriptions, and (3) vegetables. No attempt was made to dry this material, but at intervals of a few days, the interval depending on the rapidity of the accumulation and the weather, each portion was treated as follows:

1. *Meat, etc.*—All bone was removed and the edible portion was chopped, weighed, and sampled. This sample was then prepared for analysis in the ordinary manner.

2. *Bread.*—The various kinds of bread were separated, weighed, sampled, and analyzed in the usual way.

3. *Vegetables.*—This portion of the waste was thoroughly mixed, weighed, and sampled and the sample prepared for analysis in the same way as the meats. Each sample of meat and vegetable waste was analyzed separately, although "composite samples" might have been made.

This method has two decided advantages—first, a great saving of labor and fuel, and second, the possibility of an actual division of the nutrients according to their respective sources, namely, animal foods, bread and breadstuffs, and vegetables.

DESCRIPTION OF FOOD MATERIALS ANALYZED.

In connection with the dietary studies the following analyses were made:

Beef.—The local market was considerably affected by the unusually high prices which prevailed at the time when these dietary studies were made (May, 1895). Much of the beef offered for sale had been raised in the immediate vicinity, and at that season was very young, watery, and often immature as well; high prices elsewhere had forced it upon the market before it was in the proper condition.

With the exception of the samples of porterhouse steak (86) and rib ends (172), the analyses will be of little interest except in their present use. The beef used at the boarding club at a given meal was of such a varied character—often representing four or five cuts—that it was impossible with the time at our disposal to take specimens of each particular cut for analysis. Specimens 120–123, 124 and 125 are therefore samples of miscellaneous cuts of the forequarter—rib, chuck, neck,

brisket, plate, etc., in whatever proportion the several cuts were purchased in the market for each meal.

Pork.—No. 2088 was a so-called "country-cured" shoulder. Farmers salt shoulders and hams for winter and spring use, but do not smoke them. Pork cured in this way is used largely in the country, and a considerable quantity of it finds its way into town groceries.

Poultry.—No. 2706 was a fowl of average fatness.

Dairy products.—Nos. 11, 12, and 13 are milk from a Holstein-Friesian herd and No. 14 is from a Jersey herd. No. 15 is a fair specimen of farmer's butter. Nos. 4030 and 4041 are "cottolene" and "oleomargarine," respectively.

Bread, etc.—No. 5430 is wheat bread, baker's 5-cent loaf. No. 5438 is graham bread, baker's 5-cent loaf. No. 5450 is soda and sour milk or baking powder biscuit, homemade. This is the form of wheat bread principally used in country districts, and also to a considerable extent by town population. (See Table 1.) No. 5150 is wheat flour, so-called "half patent," milled in Columbia. No. 6107 is sorghum molasses.

TABLE 3.—*Composition of food materials as purchased, including both edible portion and refuse, analyzed at Columbia, Mo.*

Kind of food material.	Reference number.	Refuse.	Water.	Protein.	Fat.	Carbohydrates.	Ash.	Fuel value per pound.
ANIMAL FOOD.								
Beef:		*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per cent.*	*Per ct.*	*Calories.*
Porterhouse steak	86	14.5	49.1	16.9	18.6	....	0.9	1,100
Rib	172	21.0	42.6	14.2	21.4	....	.8	1,165
Roast	124	25.5	36.5	12.0	25.3	....	.7	1,290
Do	125	15.0	45.3	14.1	24.8	....	.8	1,310
Steak, forequarter	120	13.5	53.2	17.1	15.2	....	1.0	960
Do	121	13.5	64.4	17.3	3.7	....	1.1	480
Do	122	12.5	52.8	16.8	17.0	....	.9	1,030
Do	123	10.5	52.0	16.9	19.6	....	1.0	1,140
Cottolene	4030	....	....	....	100.0	....	....	4,220
Oleomargarine	4041	....	10.2	[1] 1.0	86.1	....	2.7	3,650
Pork: Shoulder, salted (not smoked)	2088	26.0	16.7	10.7	43.1	....	3.5	2,020
Poultry: Fowl	2706	33.0	44.7	12.8	8.8	....	.7	610
Butter	[2] 15	....	12.5	[1] 1.2	84.7	....	1.6	3,595
Milk, whole	[2] 11	....	88.7	3.5	3.7	3.4	.7	285
Milk, skimmed	[2] 12	....	91.3	3.5	.6	3.8	.8	160
Milk, skimmed, sour [3]	[2] 13	....	91.7	....	.7	....	....	....
Buttermilk [3]	[2] 14	....	91.3	....	1.1	....	....	....
VEGETABLE FOOD.								
Wheat flour, roller process	5150	....	11.1	11.7	.8	75.9	.5	1,665
Bread	5430	....	31.4	7.3	.7	59.5	1.1	1,270
Bread, graham	5438	....	30.5	7.4	2.3	58.4	1.4	1,320
Biscuit	5450	....	22.9	9.3	13.7	52.6	1.5	1,730
Molasses (sorghum)	6107	....	27.4	....	....	69.5	3.1	1,290

[1] Curd. [2] Columbia laboratory number. [3] *Only water and fat determined.*

TABLE 4.—*Composition of fresh, edible portion of food materials analyzed at Columbia, Mo.*

Kind of food material.	Reference number.	Water.	Protein.	Fat.	Carbohydrates.	Ash.	Fuel value per pound.
ANIMAL FOOD.							
Beef:		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Calories.*
Porterhouse steak	86	57.4	19.8	21.8	......	1.0	1,290
Rib	172	53.9	18.0	27.1	......	1.0	1,480
Roast	124	49.0	16.1	34.0	......	.9	1,735
Do	125	53.3	16.6	29.2	......	.9	1,540
Steak, forequarter	120	61.5	19.8	17.6	......	1.1	1,110
Do	121	74.4	20.0	4.3	......	1.3	555
Do	122	60.4	19.2	19.4	......	1.0	1,175
Do	123	58.1	18.9	21.9	......	1.1	1,275
Cottolene	4030	......	......	100.0	......	......	4,220
Oleomargarine	4041	10.2	[1]1.0	86.1	......	2.7	3,650
Pork: Shoulder, salted (not smoked)	2088	22.6	14.5	58.2	......	4.7	2,725
Poultry: Fowl	2706	66.7	19.1	13.1	......	1.1	905
Butter	[2]15	12.5	[1]1.2	84.7	......	1.6	3,595
Milk, whole	[2]11	88.7	3.5	3.7	3.4	.7	285
Milk, skimmed	[2]12	91.3	3.5	.6	3.8	.8	160
Milk, skimmed, sour[3]	[2]13	91.7	......	.7	......	......	......
Buttermilk[3]	[2]14	91.3	......	1.1	......	......	......
VEGETABLE FOOD.							
Wheat flour, roller process	5150	11.1	11.7	.8	75.9	.5	1,665
Bread	5430	31.4	7.3	.7	59.5	1.1	1,270
Bread, graham	5438	30.5	7.4	2.3	58.4	1.4	1,320
Biscuit	5450	22.9	9.3	13.7	52.6	1.5	1,730
Molasses (sorghum)	6107	27.4	......	......	69.5	3.1	1,290

[1] Curd. [2] Columbia laboratory number. [3] Only water and fat determined.

TABLE 5.—*Composition of water-free substance of edible portion of food materials analyzed at Columbia, Mo.*

Kind of food material.	Reference number.	Nitrogen.	Protein.	Fat.	Carbohydrates.	Ash.
ANIMAL FOOD.						
Beef:		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Porterhouse steak	86	7.36	46.5	51.2	......	2.3
Rib	172	6.43	39.0	58.8	......	2.2
Roast	124	5.16	31.6	66.7	......	1.7
Do	125	5.69	35.6	62.5	......	1.9
Steak, forequarter	120	8.17	51.4	45.7	......	2.9
Do	121	12.58	78.1	16.8	......	5.1
Do	122	7.64	48.5	49.0	......	2.5
Do	123	7.31	45.1	52.3	......	2.6
Cottolene	4030	......	......	100.0	......	......
Oleomargarine	4041	......	[1]1.1	95.9	......	3.0
Pork: Shoulder, salted (not smoked)	2088	2.95	18.7	75.2	......	6.1
Poultry: Fowl	2706	9.42	57.4	39.3	......	3.3
Butter	[2]15	......	[1]1.4	96.8	......	1.8
Milk, whole	[2]11	......	31.0	32.7	30.1	6.2
Milk, skimmed	[2]12	......	40.2	6.9	43.7	9.2
Milk, skimmed, sour[3]	[2]13	......	......	8.4	......	......
Buttermilk[3]	[2]14	......	......	12.6	......	......
VEGETABLE FOOD.						
Wheat flour, roller process	5150	......	13.2	.9	85.4	.5
Bread	5430	......	10.6	1.0	86.8	1.6
Bread, graham	5438	......	10.7	3.3	84.0	2.0
Biscuit	5450	......	12.1	17.8	68.2	1.9
Molasses (sorghum)	6107	......	......	......	95.7	4.3

[1] Curd. [2] Columbia laboratory number. [3] Only water and fat determined.

DIETARY STUDIES OF THE COLLEGE CLUB IN MISSOURI.

FIRST DIETARY STUDY OF THE COLLEGE CLUB (No. 94).

The study began May 10, 1895, and continued six days.

The club was composed of 98 male students, the matron, and the household servants.

The number of meals taken was as follows:

	Meals.
Men	1, 753
Women (124 meals × 0.8 meal of man) equivalent to	99
Children (20 meals × 0.7 meal of man) equivalent to	14
Total number of meals taken equivalent to	1, 866

Equivalent to one man six hundred and twenty-two days.

Remarks.—With exception of the waste no analyses were made especially for this test. When possible the estimates of composition were based upon analyses made for the final test; in other cases the averages of American analyses* were taken.

TABLE 6.—*Composition and amounts of food materials and table and kitchen wastes in dietary of the college club in Missouri (dietary No. 94).*

Kind of food material.	Percentage composition.			Weight used.			
				Total food material.	Nutrients.		
	Protein.	Fat.	Carbohydrates.		Protein.	Fat.	Carbohydrates.
ANIMAL FOOD.							
Beef:	*Per cent.*	*Per cent.*	*Per cent.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Steak[1]	17. 1	15. 2	....	16, 560	2, 832	2, 517	....
Do	17. 0	13. 4	....	8, 620	1, 465	1, 155	....
Roast[1]	13. 4	23. 8	....	52, 050	6, 975	12, 388	....
Oleomargarine[1]	1. 0	86. 1	....	16, 010	160	13, 784	....
Total	....	....	....	93, 240	11, 432	29, 844	....
Pork, etc.:							
Chops	14. 1	25. 6	....	9, 980	1, 407	2, 555	....
Shoulder[1]	10. 7	43. 1	....	5, 690	609	2, 452	....
Ham[1]	*10. 7*	*43. 1*	....	*35, 150*	*3, 761*	*15, 150*	....
Cottolene[1]	....	100. 0	....	29, 260	....	29, 260	....
Total	....	....	....	80, 080	5, 777	49, 417	....
Poultry: Fowl[1]	12. 8	8. 8	....	790	101	70	....
Fish, salmon, canned	20. 7	10. 8	1. 2	7, 150	1, 480	772	86
Eggs	13. 1	9. 5	....	32, 430	4, 248	3, 081	....
Butter[1]	1. 2	84. 7	....	13, 720	165	11, 621	....
Cheese	26. 0	34. 2	2. 3	910	237	311	21
Milk, whole[1]	3. 5	3. 7	3. 4	102, 060	3, 572	3, 776	3, 470
Milk, skimmed[1]	3. 5	. 6	3. 8	222, 720	7, 795	1, 336	8, 463
Milk, skimmed[1]	3. 3	. 7	3. 6	12, 250	404	86	441
Buttermilk[1]	3. 3	1. 1	3. 5	52, 620	1, 736	579	1, 842
Total animal food	....	....	....	617, 970	36, 947	100, 893	14, 323
VEGETABLE FOOD.							
Cereals, sugar, etc.:							
Cornmeal	8. 9	2. 2	75. 1	17, 060	1, 518	375	12, 812
Flour, wheat[1]	*11. 7*	*. 8*	*75. 9*	*100, 930*	*11, 811*	*807*	*76, 605*
Oatmeal	15. 6	7. 3	68. 0	3, 520	549	257	2, 394
Biscuit, soda[1]	9. 3	13. 7	52. 6	2, 610	243	358	1, 373
Bread, graham[1]	7. 4	2. 3	58. 4	39, 350	2, 912	905	22, 980
Bread, white[1]	7. 3	. 7	59. 5	87, 540	6, 390	613	52, 086
Crackers, cream	9. 3	13. 1	69. 2	4, 760	443	623	3, 294
Macaroni	*11. 7*	*1. 6*	72. 9	2, 490	291	40	1, 815
Sugar, granulated	....	....	100. 0	45, 340	....	....	45, 340
Molasses, sorghum[1]	....	....	69. 5	30, 730	....	....	21, 357
Cocoa	21. 6	28. 9	37. 7	230	50	66	87
Total	....	....	....	334, 560	24, 207	4, 044	240, 143

[1] Composition estimated from analyses made in the subsequent dietary.

TABLE 6.—*Composition and amounts of food materials and table and kitchen wastes in dietary of the college club in Missouri (dietary No. 94)*—Continued.

Kind of food material.	Percentage composition.			Weight used.			
	Protein.	Fat.	Carbohydrates.	Total food material.	Nutrients.		
					Protein.	Fat.	Carbohydrates.
VEGETABLE FOOD—cont'd.							
Vegetables:	*Per cent.*	*Per cent.*	*Per cent.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Beans, dried	22.3	1.8	59.1	10,090	2,250	181	5,964
Beans, string	2.2	.4	9.4	3,860	85	15	363
Corn, canned	2.8	1.3	19.3	5,900	165	77	1,139
Lettuce	1.1	.3	2.7	5,670	62	17	153
Potatoes (35.5 *per cent* refuse)	2.1	.1	18.0	101,380	2,129	101	18,249
Rhubarb	.4	.4	2.2	7,820	32	31	172
Spinach	2.1	.5	3.1	7,480	157	37	232
Tomatoes, canned	1.2	.2	4.0	25,170	302	50	1,007
Total				*167,370*	*5,182*	*509*	27,279
Fruit, nuts, etc.:							
Apples	*.4*	.4	*12.4*	11,340	*46*	45	1,406
Nectarines	.6		14.8	8,850	53		1,310
Strawberries	1.0	.7	6.8	9,870	99	69	671
Total				30,060	198	114	3,387
Total vegetable food				531,990	29,587	4,667	270,809
Total food				1,149,960	66,534	105,560	285,132
Table and kitchen waste:							
Meat	22.1	39.1		6,120	1,353	2,393	
Do	25.2	32.3		7,820	1,971	2,526	
Fat		100.0		2,150		2,150	
Total animal				16,090	3,324	7,069	
Bread	7.3	1.2	59.1	33,680	2,459	404	19,905
Vegetable	6.8	12.8	43.6	8,730	594	1,117	3,806
Do	4.3	5.3	16.7	10,660	458	565	1,780
Total vegetable				53,070	3,511	2,086	25,491
Total waste				69,160	6,835	9,155	25,491

TABLE 7.—*Recapitulation of weights and percentages of food materials and nutritive ingredients used in dietary of the college club in Missouri (dietary No. 94).*

Kind of food material.	Weight in grams.				Weight in pounds.			
	Food material.	Nutrients.			Food material.	Nutrients.		
		Protein.	Fat.	Carbohydrates.		Protein.	Fat.	Carbohydrates.
FOR FAMILY, 6 DAYS.								
Beef, veal, and mutton	93,240	11,432	29,844		205.6	25.2	65.8	
Pork, lard, etc	80,080	5,777	49,417		176.5	12.7	108.9	
Poultry	790	101	70		1.7	.2	.2	
Fish, etc	7,150	1,480	772	86	15.8	3.3	1.7	0.20
Eggs	32,430	4,248	3,081		71.5	9.4	6.8	
Butter	13,720	165	11,621		30.2	.4	25.6	
Cheese	910	237	311	21	2.0	.5	.7	.10
Milk	389,650	13,507	5,777	14,216	858.9	29.8	12.7	31.30
Total animal food	617,970	36,947	100,893	14,323	1,362.2	81.5	222.4	31.60
Cereals, sugars, starches	334,560	24,207	4,044	240,143	737.6	53.4	8.9	529.40
Vegetables	167,370	5,182	509	27,279	369.0	11.4	1.1	60.20
Fruits	*30,060*	*198*	*114*	3,387	*66.2*	.4	*.3*	7.50
Total vegetable food	531,990	29,587	4,667	270,809	1,172.8	65.4	10.3	597.10
Total food	1,149,960	66,534	105,560	285,132	2,535.0	146.7	232.7	628.70

TABLE 7.—*Recapitulation of weights and percentages of food materials and nutritive ingredients used in dietary of the college club in Missouri (dietary No. 94)*—Cont'd.

Kind of food material.	Weight in grams.				Weight in pounds.			
	Food material.	Nutrients.			Food material.	Nutrients.		
		Protein.	Fat.	Carbohydrates.		Protein.	Fat.	Carbohydrates.
PER MAN PER DAY.								
Beef, veal, and mutton	150	18	48	....	0.33	0.04	0.11	....
Pork, lard, etc	129	9	79	....	.29	.02	.18	....
Poultry	1	....	....	....	....	....	....	....
Fish, etc	12	2	1	....	.03	....	....	....
Eggs	52	7	5	....	.11	.02	.01	....
Butter	22	....	19	....	.05	....	.04	....
Cheese	1	1	1	....	....	....	....	....
Milk	627	22	9	23	1.38	.05	.02	0.05
Total animal food	994	59	162	23	2.19	.13	.36	.05
Cereals, sugars, starches	538	39	6	386	1.19	.09	.01	.85
Vegetables	269	9	1	44	.59	.02	....	.10
Fruits	48	....	....	5	.11	....	....	.01
Total vegetable food	855	48	7	435	1.89	.11	.01	.96
Total food	1,849	107	169	458	4.08	.24	.37	1.01
PERCENTAGES OF TOTAL FOOD.	*Per cent.*	*Per ct.*	*Per ct.*	*Per cent.*				
Beef, veal, and mutton	8.1	17.2	28.3	....	....	....	....	....
Pork, lard, etc	6.9	8.7	46.8	....	....	....	....	....
Poultry	.1	.1	.1	....	....	....	....	....
Fish, etc	.6	2.2	.7	....	....	....	....	....
Eggs	2.8	6.4	2.9	....	....	....	....	....
Butter	1.2	.2	11.0	....	....	....	....	....
Cheese	.1	.4	.3	....	....	....	....	....
Milk	33.9	20.3	5.5	5.0	....	....	....	....
Total animal food	53.7	55.5	95.6	5.0	....	....	....	....
Cereals, sugars, starches	29.1	36.4	3.8	84.2	....	....	....	....
Vegetables	14.6	7.8	.5	9.6	....	....	....	....
Fruits	2.6	.3	.1	1.2	....	....	....	....
Total vegetable food	46.3	44.5	4.4	95.0	....	....	....	....
Total food	100.0	100.0	100.0	100.0	....	....	....	....

TABLE 8.—*Nutrients and potential energy in food purchased, rejected, and eaten in dietary of the college club in Missouri (dietary No. 94).*

Kind of food material.	Nutrients.			Fuel value.
	Protein.	Fat.	Carbohydrates.	
Food purchased:	*Grams.*	*Grams.*	*Grams.*	*Calories.*
Animal	36,947	100,893	14,323	1,148,510
Vegetable	29,587	4,667	270,809	1,275,030
Total	66,534	105,560	285,132	2,423,540
Waste:				
Animal	3,324	7,069	....	79,370
Vegetable	3,511	2,086	25,491	138,310
Total	6,835	9,155	25,491	217,680
Food actually eaten:				
Animal	33,623	93,824	14,323	1,069,140
Vegetable	26,076	2,581	245,318	1,136,720
Total	59,699	96,405	259,641	2,205,860

TABLE 8.—*Nutrients and potential energy in food purchased, rejected, and eaten in dietary of the college club in Missouri (dietary No. 94)*—Continued.

Kind of food material.	Nutrients.			Fuel value.
	Protein.	Fat.	Carbohydrates.	
PER MAN PER DAY.				
Food purchased:	*Grams.*	*Grams.*	*Grams.*	*Calories.*
Animal	59	162	23	1,840
Vegetable	48	7	435	2,045
Total	107	169	458	3,885
Waste:				
Animal	5	11	....	125
Vegetable	6	3	41	220
Total	11	14	41	345
Food actually eaten:				
Animal	54	151	23	1,715
Vegetable	42	4	394	1,825
Total	96	155	417	3,540
PERCENTAGES OF TOTAL FOOD PURCHASED.				
Food purchased:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Animal	55.5	95.6	5.0	47.4
Vegetable	44.5	4.4	95.0	52.6
Total	100.0	100.0	100.0	100.0
Waste:				
Animal	5.0	6.7	....	3.3
Vegetable	5.3	2.0	8.9	5.7
Total	10.3	8.7	8.9	9.0
Food actually eaten:				
Animal	50.5	88.9	5.0	44.1
Vegetable	39.2	2.4	86.1	46.9
Total	89.7	91.3	91.1	91.0

SECOND DIETARY STUDY OF THE COLLEGE CLUB (No. 95).

The study began May 20, 1895, and continued seven days.

During this period the club was composed of 95 male students, the matron, and household servants.

The number of meals taken was as follows:

	Meals.
Men	1,978
Women (156 meals × 0.8 meal of man) equivalent to	125
Children (40 meals × 0.7 meal of man) equivalent to	28
Total number of meals taken equivalent to	2,131

Equivalent to one man seven hundred and ten days.

A considerable number of food materials were analyzed in this dietary, as was also the refuse. Such analyses are designated in the table following on page 17 by the letter *a*.

TABLE 9.—*Composition and amounts of food materials and table and kitchen wastes in dietary of the college club in Missouri (dietary No. 95).*

Kind of food material.	Percentage composition.			Weight used.			
					Nutrients.		
	Protein.	Fat.	Carbohydrates.	Total food material.	Protein.	Fat.	Carbohydrates.
ANIMAL FOOD.	*Per ct.*	*Per ct.*	*Per cent.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Beef:							
Steak, forequarter (*a*)	17.1	15.2	....	9,750	1,667	1,482	....
Do	17.3	3.7	....	10,660	1,844	394	....
Steak, forequarter [1]	17.3	3.7	....	5,330	922	197	....
Steak, forequarter (*a*)	16.8	17.0	....	5,440	914	925	....
Do	16.9	19.6	....	10,210	1,726	2,001	....
Steak, porterhouse (*a*)	16.9	18.6	....	9,750	1,648	1,813	....
Roast, miscellaneous (*a*)	12.0	25.3	....	10,770	1,292	2,725	....
Do	14.1	24.8	....	9,980	1,407	2,475	....
Roast, miscellaneous [1]	13.1	25.1	....	16,560	2,169	4,157	....
Roast, chuck [1]	17.0	13.4	....	11,340	1,928	1,520	....
Rib ends (*a*)	14.2	21.4	....	3,740	531	800	....
Dried and smoked	31.8	6.8	0.6	680	216	46	4
Bologna	18.0	19.7	....	2,270	409	447	....
Oleomargarine	1.0	86.1	....	14,630	146	12,596	....
Total	....	....	....	121,110	16,819	31,578	4
Pork, etc:							
Shoulders, salted (*a*)	10.7	43.1	....	19,160	2,050	8,258	....
Cottolene	....	100.0	....	49,220	....	49,220	....
Total (*a*)	....	....	....	68,380	2,050	57,478	....
Poultry: Fowl (*a*)	12.8	8.8	....	16,100	2,061	1,417	....
Eggs	13.1	9.5	....	41,280	5,408	3,921	....
Butter (*a*)	1.2	84.7	....	23,250	279	19,692	....
Cheese	26.0	34.2	2.3	8,160	2,121	2,791	188
Milk, whole (*a*)	3.5	3.7	3.4	142,770	4,997	5,283	4,854
Milk, skimmed (a)	3.5	.6	3.8	274,430	9,605	1,647	10,428
Milk, skimmed, sour (*a*)	3.3	.7	3.6	44,430	1,466	311	1,600
Buttermilk (*a*)	3.3	1.1	3.5	58,970	1,946	649	2,064
Total animal food	....	....	....	798,880	46,752	124,767	19,138
VEGETABLE FOOD.							
Cereals, sugar, etc:							
Corn meal	8.9	2.2	75.1	22,230	1,978	489	16,695
Flour, wheat (*a*)	11.7	.8	75.9	99,680	11,663	797	75,657
Oatmeal	15.6	7.3	68.0	4,880	761	356	3,318
Biscuit, soda (*a*)	9.3	13.7	52.6	680	63	93	358
Bread, graham (*a*)	7.4	2.3	58.4	45,930	3,399	1,056	26,823
Bread, wheat (*a*)	7.3	.7	59.5	89,360	6,523	625	53,169
Crackers, cream	9.3	13.1	69.2	7,140	664	935	4,941
Sugar, granulated	....	....	100.0	36,400	....	....	36,400
Sugar, brown (*a*)	....	....	99.2	29,140	....	....	28,907
Molasses, sorghum (*a*)	....	....	69.5	25,860	....	....	17,973
Cocoa	21.6	28.9	37.7	340	74	98	128
Total	....	....	....	361,640	25,125	4,449	264,369
Vegetables:							
Beans, string	2.2	.4	9.4	4,990	110	20	469
Cabbage, edible portion	2.1	.4	5.8	4,310	91	17	250
Corn, canned	2.8	1.3	19.3	25,520	715	332	4,925
Lettuce	1.1	.3	2.7	3,180	35	9	86
Onions	1.5	.4	8.9	1,930	29	7	172
Peas, shelled	4.4	.5	16.1	2,270	100	11	366
Potatoes (31.5 per cent refuse)	2.1	.1	18.0	90,150	1,893	90	16,227
Radishes	1.0	.1	4.6	11,000	110	11	506
Rhubarb	.4	.4	2.2	17,690	70	71	389
Spinach	2.1	.5	3.1	12,470	262	62	387
Tomatoes, canned	1.2	.2	4.0	14,180	170	29	567
Total	....	....	....	187,690	3,585	659	24,344
Fruits, nuts, etc.:							
Bananas, pulp	1.2	.8	22.9	1,360	16	11	312
Jelly	1.1	....	77.1	4,540	50	....	3,500
Pears	.5	.6	10.6	16,330	82	98	1,732
Strawberries	1.0	.7	6.8	16,330	163	114	1,111
Total	....	....	....	38,560	311	223	6,655
Total vegetable food	....	....	....	587,890	29,021	5,331	295,368
Total food	....	....	....	1,386,770	75,773	130,098	314,506

[1] Estimated from other analyses.

TABLE 9.—*Composition and amounts of food materials and table and kitchen wastes in dietary of the college club in Missouri (dietary No. 95)*—Continued.

Kind of food material.	Percentage composition.			Weight used.			
					Nutrients.		
	Protein.	Fat.	Carbohydrates.	Total food material.	Protein.	Fat.	Carbohydrates.
VEGETABLE FOOD—continued.							
Table and kitchen waste:	*Per ct.*	*Per ct.*	*Per cent.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Meat (*a*)	21.9	23.7	....	6,350	1,391	1,505	....
Do	23.4	37.7	....	6,350	1,486	2,394	....
Do	22.1	35.0	....	6,010	1,328	2,103	....
Fat	....	100.0	....	4,540	....	4,540	....
Total animal	....	....	....	23,250	4,205	10,542	....
Bread, wheat (*a*)	7.3	.7	59.5	26,650	1,945	187	15,857
Bread, graham (*a*)	7.4	2.3	58.4	6,920	512	159	4,041
Biscuit, soda (*a*)	9.3	13.7	52.6	8,960	833	1,228	4,713
Vegetable (*a*)	2.7	2.9	13.6	5,780	156	168	786
Do	3.0	3.6	15.3	5,780	173	208	884
Do	2.8	5.0	12.5	9,070	254	454	1,134
Total vegetable	....	....	....	63,160	3,873	2,404	27,415
Total waste	....	....	....	86,410	8,078	12,946	27,415

TABLE 10.—*Recapitulation of weights and percentages of food materials and nutritive ingredients used in dietary of the college club in Missouri (dietary No. 95).*

Kind of food material.	Weight in grams.				Weight in pounds.			
		Nutrients.				Nutrients.		
	Food material.	Protein.	Fat.	Carbohydrates.	Food material.	Protein.	Fat.	Carbohydrates.
FOR FAMILY, 7 DAYS.								
Beef, veal, and mutton	121,110	16,819	31,578	4	266.9	37.1	69.6	....
Pork, lard, etc	68,380	2,050	57,478	....	150.7	4.5	126.7	....
Poultry	16,100	2,061	1,417	....	35.5	4.6	3.1	....
Eggs	41,280	5,408	3,921	....	91.0	11.9	8.7	....
Butter	23,250	279	19,692	....	51.3	.6	43.4	....
Cheese	8,160	2,121	2,791	188	18.0	4.7	6.2	0.40
Milk	520,600	18,014	7,890	18,946	1,147.7	39.7	17.4	41.80
Total animal food	798,880	46,752	124,767	19,138	1,761.1	103.1	275.1	42.20
Cereals, sugars, starches	361,640	25,125	4,449	264,369	797.3	55.4	9.8	582.80
Vegetables	187,690	3,585	659	24,344	413.8	7.9	1.4	53.60
Fruits	38,560	311	223	6,655	85.0	.7	.5	14.70
Total vegetable food	587,890	29,021	5,331	295,368	1,296.1	64.0	11.7	651.10
Total food	1,386,770	75,773	130,098	314,506	3,057.2	167.1	286.8	693.30
PER MAN PER DAY.								
Beef, veal, and mutton	170	24	45	....	.37	.05	.10	....
Pork, lard, etc	96	3	81	....	.21	.01	.18	....
Poultry	23	3	2	....	.05	.01	.01	....
Eggs	58	8	5	....	.13	.02	.01	....
Butter	33	....	28	....	.07	....	.06	....
Cheese	12	3	4	....	.03	.01	.01	....
Milk	733	25	11	27	1.62	.05	.02	.06
Total animal food	1,125	66	176	27	2.48	.15	.39	.06
Cereals, sugars, starches	510	35	6	372	1.12	.08	.01	.82
Vegetables	264	5	1	34	.58	.01	....	.08
Fruits	54	1	....	10	.12	....	....	.02
Total vegetable food	828	41	7	416	1.82	.09	.01	.92
Total food	1,953	107	183	443	4.30	.24	.40	.98

TABLE 10.—*Recapitulation of weights and percentages of food materials and nutritive ingredients used in dietary of the college club in Missouri (dietary No. 95)*—Cont'd.

Kind of food material.	Weight in grams.				Weight in pounds.			
	Food material.	Nutrients.			Food material.	Nutrients.		
		Protein.	Fat.	Carbohydrates.		Protein.	Fat.	Carbohydrates.
PERCENTAGES OF TOTAL FOOD.	*Per cent.*	*Per ct.*	*Per ct.*	*Per cent.*				
Beef, veal, and mutton	8.7	22.2	24.3	....	....	....	....	....
Pork, lard, etc	4.9	2.7	44.2	....	....	....	....	....
Poultry	1.2	2.7	1.1	....	....	....	....	....
Eggs	3.0	7.1	3.0	....	....	....	....	....
Butter	1.7	.4	15.1	....	....	....	....	....
Cheese	.6	2.8	2.1	....	....	....	....	....
Milk	37.5	23.8	6.1	6.1	....	....	....	....
Total animal food	57.6	61.7	95.9	6.1	....	....	....	....
Cereals, sugars, starches	26.1	33.2	3.4	84.1	....	....	....	....
Vegetables	13.5	4.7	.5	7.7	....	....	....	....
Fruits	2.8	.4	.2	2.1	....	....	....	....
Total vegetable food	42.4	38.3	4.1	93.9	....	....	....	....
Total food	100.0	100.0	100.0	100.0	....	....	....	....

TABLE 11.—*Nutrients and potential energy in food purchased, rejected, and eaten in dietary of the college club in Missouri (dietary No. 95).*

Kind of food material.	Nutrients.			Fuel value.
	Protein.	Fat.	Carbohydrates.	
Food purchased:	*Grams.*	*Grams.*	*Grams.*	*Calories.*
Animal	46,752	124,767	19,138	1,430,480
Vegetable	29,021	5,331	295,368	1,379,570
Total	75,773	130,098	314,506	2,810,050
Waste:				
Animal	4,205	10,542	....	115,280
Vegetable	3,873	2,404	27,415	150,640
Total	8,078	12,946	27,415	265,920
Food actually eaten:				
Animal	42,547	114,225	19,138	1,315,200
Vegetable	25,148	2,927	267,953	1,228,930
Total	67,695	117,152	287,091	2,544,130
PER MAN PER DAY.				
Food purchased:				
Animal	66	176	27	2,020
Vegetable	41	7	416	1,940
Total	107	183	443	3,960
Waste:				
Animal	6	15	....	165
Vegetable	5	3	39	210
Total	11	18	39	375
Food actually eaten:				
Animal	60	161	27	1,855
Vegetable	36	4	377	1,730
Total	96	165	404	3,585
PERCENTAGES OF TOTAL FOOD PURCHASED.				
Food purchased:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Animal	61.7	95.9	6.1	50.9
Vegetable	38.3	4.1	93.9	49.1
Total	100.0	100.0	100.0	100.0

TABLE 11.—*Nutrients and potential energy in food purchased, rejected, and eaten in dietary of the college club in Missouri (dietary No. 95)*—Continued.

Kind of food material.	Nutrients.			Fuel value.
	Protein.	Fat.	Carbohydrates.	
PERCENTAGES OF TOTAL FOOD PURCHASED—continued.				
Waste:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Animal	5.6	8.1	....	4.1
Vegetable	5.1	1.8	8.7	5.4
Total	10.7	9.9	8.7	9.5
Food actually eaten:				
Animal	56.1	87.8	6.1	46.8
Vegetable	33.2	2.3	85.2	43.7
Total	89.3	90.1	91.3	90.5

COMMENTS ON THE FOOD INVESTIGATIONS AT THE UNIVERSITY OF MISSOURI.

By W. O. Atwater and Chas. D. Woods.

After Professor Gibson had presented the foregoing, as a preliminary report of the food investigations undertaken by himself and associates at the University of Missouri, and before he had opportunity to give it the final revision which had been contemplated, he was stricken with an illness which proved fatal. His greatly lamented death not only prevents the contemplated elaboration of the results already obtained, but interrupts for the time the inquiries into the food economy of the people of Missouri which had been so successfully begun at the university. Much that Professor Gibson hoped to say and do must therefore be left unsaid and undone until the work can be taken up by others. Meanwhile the writers, with whom Professor Gibson had been associated for a number of years before going to Missouri and who have been familiar with his work there, add here a few comments.

THE BREAD AND MEAT CONSUMPTION OF FAMILIES IN MISSOURI.

The method of inquiry and the results detailed on pages 7, 8 are of no little interest. Of course, statistics obtained by this method are always incomplete, but with the limited time and funds at Professor Gibson's disposal it is not easy to see how better answers to the questions as to the kinds and the relative amounts of meats and bread used in the ordinary households could have been obtained, and the number of families represented in the report is so large as to give decided value to the average figures.

It is to be remembered that these statistics are from families of the classes whose sons were at the university. It would seem, therefore, that they could hardly be assumed to represent exactly the eating habits of the average people of either the country districts or the cities of Missouri.

It will be observed that the term "bread" includes (1) ordinary wheat bread raised by use of yeast and designated as "raised" bread; (2) "biscuit" made from wheat flour but not fermented, and (3) "corn bread" made from maize.

The figures of the last column of the table, "Other meats, etc.," include game and fish. The figures show the proportion which each kind makes of the total amount consumed, but give no indication of the absolute quantities per person or per family for a given time.

How largely the sources of supply regulate the character of the food consumption is illustrated by the following table, taken from the figures given on page 8:

TABLE 12.—*Kinds of bread and meat eaten by families in country and city.*

	Kinds of bread.			Kinds of meat.		
	Raised.	Biscuit.	Corn.	Beef, veal, mutton.	Pork.	Other meats, etc.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Farmers living in country, with limited access to markets	31	54	16	24	57	19
Families living in cities or larger towns, with better markets	40	48	12	53	27	20

Evidently there is relatively much less of raised bread and more of corn bread and biscuit eaten in the country than in the town. It would seem natural to assume that the larger proportion of yeast-raised bread in the cities is due to bakers, to the ease with which good quick-acting yeast can be obtained, and to the fact that city people have more convenient markets to buy in and more ready money. The effect of supply upon the kinds of meat eaten is even more evident. Pork is easily raised on the farm, and in the form of salt pork, bacon, and ham is readily preserved for later use. On the other hand, city people can always have fresh beef, veal, and mutton from the markets. That this accounts largely for the fact that pork constitutes 57 per cent of the meat supply of the farmers' families and only 27 per cent of that of families living in the large towns is hardly to be doubted, though, of course, the relative cost may be a factor also. The fact that beef, veal, and mutton make more than half of the total meats eaten by well-to-do people in the cities and less than a quarter of that used by thrifty farmers is naturally explained in the same way.

COMPARISON OF DIETARIES OF COLLEGE STUDENTS IN MISSOURI, TENNESSEE AND CONNECTICUT.

It will be interesting to compare the results of the studies of the two dietaries of the students' club at the University of Missouri with those of investigations of other college clubs. The only other studies of this character made in the United States, and at present available and exactly comparable with these, so far as we are aware, are several series of dietary studies of students' clubs at Wesleyan University,[1] Middletown, Conn., and at the University of Tennessee,[2] Knoxville, Tenn.

[1]Connecticut Storrs Station Reports, 1891–1894, and U. S. Dept. Agr., Office of Experiment Stations Bul. 21.

[2]U. S. Dept. Agr., Office of Experiment Stations Bul. 29.

The students of the University of Missouri were mostly residents of that State, and it would seem fair to assume that their eating habits would be more or less such as they had acquired at home, although the diet in Columbia would be somewhat modified by the markets in that city at the time when the dietaries were made.

In the following table the results of the dietary studies at the three colleges are summarized. There is also appended to the table for comparison a suggested dietary standard for a man at light work.[1] These comparisons are based upon the quantities of food actually eaten and not upon the total food purchased.

TABLE 13.—*Comparison of nutrients in food eaten by college clubs in Missouri, Tennessee, and Connecticut.*

[Quantities per man per day.]

Kind of food material.	Protein.	Fats.	Carbohydrates.	Fuel values.	Nutritive ratio.
FOOD EATEN.					
In Missouri:	*Grams.*	*Grams.*	*Grams.*	*Calories.*	
Animal	57	156	25	1,785	....
Vegetable	39	4	385	1,775	....
Total	96	160	410	3,560	1: 8.0
In Tennessee:					
Animal	43	114	12	1,280	....
Vegetable	49	13	467	2,240	....
Total	92	127	479	3,520	1: 8.3
In Connecticut:					
Animal	63	131	21	1,560	....
Vegetable	36	8	315	1,580	....
Total	99	139	336	3,140	1: 6.7
Average of above:					
Animal	53	131	19	1,505	....
Vegetable	42	9	400	1,915	....
Total	95	140	419	3,420	1: 7.8
Suggested standard for man with light muscular work (Atwater)	112	....	....	3,000	1: 5.5

We are far from urging that these results portray accurately the dietary practices of the people of the different sections represented by the young men in the three institutions. Still the families represented were doubtless numerous enough to represent fairly well the people of their classes and communities.

The case was similar with the club at Knoxville, whose members were nearly all from Tennessee. The homes of the students at Middletown were scattered through the northern Atlantic States, though a few were from other States and countries. The larger number were from towns with markets in which the available food materials were very similar to those in Middletown. The cost of board, like the general living expenses of the students at Middletown, was decidedly larger than that of the young men at Knoxville and Columbia.

[1] U. S. Dept. Agr., Office of Experiment Stations Bul. 21.

It will be noticed that, as measured by the suggested standard, the food eaten in all three of the college clubs was deficient in protein and had an excess of the nutrients (fats and carbohydrates) which serve simply as fuel and tend to make the nutritive ratios wide. The standard represents nothing more than the attempt to state in a general way the proportions of nutrients which physiological experiment on the one hand and observations of the dietary habits of the best fed people on the other imply to be most appropriate. Among different dietaries here summarized the narrowest nutritive ratio is found in those representing the people who were most favorably situated with respect to both the kinds of food materials at their disposal and the pecuniary ability to select at will. The inference is that the diet of all, and especially of those in the more Southern States, would be improved by diminishing the carbohydrates and fats and increasing the protein.[1]

[1] See reference to the same subject in discussion of the dietaries of the students at the University of Tennessee, U. S. Dept. Agr., Office of Experiment Stations Bul. 29.